

# Investigation

# 1

## Making Comparisons

**S**urveys may report people's preferences in food, cars, or political candidates. Often, the favorites are easy to recognize. Explaining how much more popular one choice is than another can be more difficult. In this investigation, you will explore strategies for comparing numbers in accurate and useful ways. As you work on the problems, notice how the different ways of making comparisons send different messages about the numbers being compared.

### 1.1 Ads That Sell

**A**n ad for the soft drink Bolda Cola starts like this:



To complete the ad, the Bolda Cola company plans to report the results of taste tests. A copywriter for the ad department has proposed four possible conclusions.

1. In a taste test, people who preferred Bolda Cola outnumbered those who preferred Cola Nola by a ratio of 17,139 to 11,426.
2. In a taste test, 5,713 more people preferred Bolda Cola.
3. In a taste test, 60% of the people preferred Bolda Cola.
4. In a taste test, people who preferred Bolda Cola outnumbered those who preferred Cola Nola by a ratio of 3 to 2.

### Problem 1.1 Exploring Ratios and Rates

- A. Describe what you think each statement above means.
- B. Which of the proposed statements do you think would be most effective in advertising Bolda Cola? Why?
- C. Is it possible that all four statements are based on the same survey data? Explain your reasoning.
- D. In what other ways can you express the claims in the four proposed advertising statements? Explain.
- E. If you were to survey 1,000 cola drinkers, what numbers of Bolda Cola and Cola Nola drinkers would you expect? Explain.

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## 1.2 Targeting an Audience

Some middle and high school students earn money by delivering papers, mowing lawns, or baby-sitting. Students with money to spend are a target audience for some radio and television ads. Companies gather information about how much students watch television or listen to the radio. This information influences how they spend their advertising dollars.

As you work on this problem and the rest of the unit, you will see statements about ratio comparisons. In mathematics, it is acceptable to write ratios in different ways. Each way is useful.

Ways to Write a Ratio		
3 to 2	3 : 2	$\frac{3}{2}$

It can be confusing to see a fraction representing a ratio. A ratio is usually, but not always, a *part-to-part* comparison. A fraction usually means a *part-to-whole* comparison. The context can help you decide whether a fraction represents a ratio.

### Problem 1.2 Analyzing Comparison Statements

Students at Neilson Middle School are asked if they prefer watching television or listening to the radio. Of 150 students, 100 prefer television and 50 prefer radio.

- A. How would you compare student preferences for radio or television?
- B. Decide if each statement accurately reports results of the Neilson Middle School survey.
  - 1. At Neilson Middle School,  $\frac{1}{3}$  of the students prefer radio to television.
  - 2. Students prefer television to radio by a ratio of 2 to 1.
  - 3. The ratio of students who prefer radio to television is 1 to 2.
  - 4. The number of students who prefer television is 50 more than the number of students who prefer radio.
  - 5. The number of students who prefer television is two times the number who prefer radio.
  - 6. 50% of the students prefer radio to television.
- C. Compare statements in parts (4) and (5) above. Which is more informative? Explain.
- D. Consider only the accurate statements in Question B.
  - 1. Which statement would best convince merchants to place ads on radio? Why?
  - 2. Which statement would best convince merchants to place ads on television? Why?

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## 1.3 American Records

People are amazed and amused by records like the highest mountain, the longest fingernails, or the most spoons balanced on a face. What you have learned so far can help you make comparisons. In Problem 1.3, you will compare the largest living trees of different species.

### Did You Know?

The champion white “Wye” oak tree near Wye Mills, Maryland, was about 460 years old when it fell during a thunderstorm in 2002. When the tree fell, thousands came by to gawk, shed tears, and pick up a leaf or a twig. Maryland officials carefully gathered and stored as much of the tree as they could until a suitable use could be found.

The challenge to find a white oak bigger than the Wye Mills tree launched the National Register of Big Trees. The search led to the discovery of a new national champion white oak in Virginia.



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You can describe the size of a tree by comparing it to other trees or familiar things.

### Selected Champion Trees

Tree Type	Circumference (ft)	Height (ft)	Spread/Diameter (ft)
Giant Sequoia (Calif.)	83.2	275	107
Coast Redwood (Calif.)	79.2	321	80
Swamp Chestnut Oak (Tenn.)	23.0	105	216
Florida Crossopetalum (Fla.)	0.4	11	3
White Oak (Md.)	31.8	96	119

SOURCE: *Washington Post*

### Problem 1.3 Writing Comparison Statements

A. Use the table on the previous page.

1. How many coast redwood spreads does it take to equal the spread of the white oak?
2. Kenning says that the spread of the white oak is greater than that of the coast redwood by a ratio of about 3 to 2. Is he correct? Explain.
3. Mary says the difference between the heights of the coast redwood and the giant sequoia is 46 feet. Is she correct? Explain.
4. How many giant sequoia spreads does it take to equal the spread of the swamp chestnut oak?
5. Jaime says the spread of the giant sequoia is less than 50% of the spread of the swamp chestnut oak. Is he correct?
6. Len says the circumference of the swamp chestnut oak is about three fourths the circumference of the white oak. Is he correct?



B. The tallest person in history, according to the *Guinness Book of World Records*, was Robert Wadlow. He was nearly 9 feet tall. Write two statements comparing Wadlow to the trees in the table. Use fractions, ratios, percents, or differences.

C. Average waist, height, and arm-span measurements for a small group of adult men are given.

Waist = 32 inches      Height = 72 inches      Arm Span = 73 inches

Write two statements comparing the data on these men to the trees in the table. Use fractions, ratios, percents, or differences.

D. When a problem requires comparison of counts or measurements, how do you decide whether to use differences, ratios, fractions, or percents?

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